New Paradigm Recommends Advanced Production Process Concept Involving RAM Material Infusion Within Metal-RAM Hybrid Non-Solid Metallic Aircraft Unibody Structures in Support of Backstopped Stealth

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Introduction

A new paradigm which prompts a need to create countermeasures against penetrative forms of electromagnetism such as helical electromagnetism suggest consideration of novel modes implementation of stealth-supporting materials such as RADAR-Absorptive Materials and RADAR-Absorptive Complex Structures (RACS.) Traditionally, RAM and RACS have been incorporated exclusively in the integument layer of aircraft with the intent of absorbing as completely as possible all EM before it may interact with sold metallic internal components such as the aircraft chassis/unibody.

Abstract

In the absence of an available RAM/RACS combination which is capable of fully absorbing either helical or soliton-form EM, mitigating RADAR cross-section may call for a top-down redesign of aircraft unibodies in which RAM/RACS are physically incorporated within the chassis of aircraft, as well as any other metallic components which would retain sufficient functionality if constructed from non-solid metallic pieces.

This, when combined with constructing aircraft from, insofar as is possible, non-metallic components, may be an approach explored in the near future by any entity which cannot perfect a production process for total-absorptive materials such as pressurized encapsulated quartz-infused (ibid. 18 January 2024) paints which are capable of absorbing all electromagnetism regardless of amplitude, frequency or structure but which could be expected to have high production costs if developed and produced.

The incorporation of advanced non-total absorptive materials within purposefully non-solid metal-RAM hybrid unibody aircraft chassis could prove to be an effective approach for mitigating RADAR cross-section in future platforms.

Importantly, aircraft may be constructed entirely from non-metallic composite materials which have virtually no property of RADAR-reflectivity with the exception being the propulsive systems of modern (including and especially PoMP-propelled aircraft systems such as the X-65) which necessarily must include metallic components; sc. a series of copper actuator plates about a centimeter in thickness in the case of the X-65.

Those actuator plates could perform their function effectively even if they were constructed with layered RAM materials. The same is true for conventional jet thrusters, but is not true for turbofan engines which would be vulnerable to cracking if such a design were employed in their case. This is not problematic given that aircraft employing turbofan engines are not considered to be nor relied upon to be used for purposes which require low-RCS.

Depending upon the precise design, the incorporation of RAM could weaken aircraft unibodies, but a sufficiently thoughtful design approach (ideally a gyroidal design in which air gaps are filled with RAM) would preserve strength whilst enabling a mitigation of RCS.

Conclusion

While we ought to rapidly work toward perfecting an economical production process for the pressurized-quartz-infused paint described in 18 January 2024, we must consider employing novel production processes for aircraft chassis which mitigate the RCS of the chassis, itself, in addition to aircraft integument. We should be prepared for adversaries to adopt similar approaches to chassis construction in the near future.